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EXAMINER	
PIGGUSH, AARON C	

ART UNIT	PAPER NUMBER
2838	

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Please find below and/or attached an Office communication concerning this application or proceeding.

ASL

Office Action Summary	Application No.	Applicant(s)	
	10/626,732	NISHIDA, JUNJI	
	Examiner	Art Unit	
	Aaron Piggush	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5, 9, 10, 13-18, and 20-22* is/are rejected.

7)☒ Claim(s) *1-22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 July 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *06 November 2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because of the following: Fig. 6B has the label "ST12" which should read "S12." Additionally, S12 in Fig. 3B and Fig. 6B has a less than or equal to sign, which is believed to be correct. However, it does not match the specifications on page 19 paragraph 0061 where only "smaller than" is listed, and therefore, the specification or drawing should be adjusted accordingly. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The title of the invention could be improved. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Method and Apparatus for Non-aqueous or Lithium-ion Secondary Battery Charging with Constant Current, Constant Voltage, and Pulsed Charging.

3. The disclosure is objected to because of the following informalities:

On page 5, paragraphs 0016 and 0017 are the same except for the word "charge" preceding "control circuit." It is suggested that you remove paragraph 0016.

On pg 7, para 0021, the phrase "the charge-end detecting circuit" was repeated.

On pg 13, para 0047, it is stated that "V1-V4 are set as follows," but V4 is not addressed. In para 0046, "Vs2" should read "V2" for the second predetermined constant voltage. Additionally in para 0046, "V3>V4" should read "V4>V3" in order to agree with the statement that "Vs4>Vs3" since Vs4 and Vs3 are based on V4 and V3, respectively. Furthermore in para 0046, "voltage Vs3 on the third" should read "voltage Vs3 based on the third."

On page 16, para 0054, "first predetermined constant voltage V1" should read "third predetermined constant voltage V3."

On page 17, para 0057, "the third predetermined constant voltage V3" should read "the first predetermined constant voltage V1."

On page 18, para 0060, "constant voltage" should read "constant current."

On pg 19, para 0061, "smaller than" should read "smaller than or equal to" according to S12 in Fig. 3B and 6B. Either the specification or the drawing should be corrected.

On pg 19 and 20, para 0063 and 0064 seem out of place and have already been stated or summarized. It is suggested that they are relocated or removed.

On pg 23, para 0073, "smaller than" should read "equal to" or "greater than or equal to" when referring to Vb and the first and second constant voltages.

Appropriate correction is required.

Claim Objections

4. Claims 1-22 are objected to because of the following informalities: Claims 1 and 15, the independent claims, describe a battery charging apparatus which charges a secondary battery; however, the term "second" should be replaced with the term "secondary" in order to agree with the method and apparatus described. Since the rest of the claims are dependent on claims 1 and 15, they are also objected to, and therefore, all of the dependent claims that include the term "second" when referring to the battery should also be changed to "secondary." Appropriate correction is required.

5. Claims 3-8 and 10-12 are also objected to because of the following informalities: In claim 3, line 3, a third constant voltage is referred to; however, the claims do not previously recite first and second constant voltages and therefore lack proper antecedent basis. Since claims 4-8 and 10-12 are dependent on claim 3, they are also objected to and should be corrected in the same manner. Appropriate correction is required.

6. Claims 11 and 12 are also objected to because of the following informalities: The claims include the term "signal" when referring to the integrated circuit chip. According to the specification, several components of the battery charging device were described as being integrated into a "single" integrated circuit chip. It is unclear which word is meant to be used in the claims, since either of the words "signal" or "single" could be applied. For examination purposes, the term "single" was applied to those claims. Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 3 and 16-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3 and 16, lines 3-6, recite "the battery voltage of the second battery becomes substantially equal to the third constant voltage... and the battery voltage of the second battery becomes substantially equal to a first constant voltage smaller than the third constant voltage." It is unclear how the battery voltage can equal any constant voltage during the pulse/pause charging when the voltage of the battery is continually rising throughout the entire process, as in view of Fig. 2 and Fig. 5. For examination purposes, the constant voltages are taken to mean reference constant voltages that are not changing throughout the pulse charging process.

Claim 17, lines 4-5 and 8-9, recites "the third pre-set voltage equal to or greater than the second pre-set voltage... a fourth pre-set voltage equal to or greater than the third pre-set voltage." It is unclear why there would be a need for a third pre-set voltage when the battery voltage could be equal to or greater than the second pre-set voltage for the next charging action to take place. According to the specification, the third pre-set voltage should be greater than the second-pre set voltage, not equal to it. The same reasoning is applied to the fourth pre-set voltage. For examination purposes, each pre-set voltage will be interpreted as "greater than" the lower pre-set voltage, as was set forth in the specification.

Claim 18, lines 2-4, recites "the battery voltage of the second battery becomes substantially equal to the third constant voltage during the first and second constant current charging." It is unclear how the battery voltage can become equal to a single constant voltage during two different constant current charging states. This implies that the battery voltage changes in between the two constant current charging cycles after a constant voltage has been reached, which it does not, especially in view of Fig. 2 and Fig. 5.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1-3, 10, 15, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Broell (US 5,710,506).

With respect to claim 1, Broell discloses a battery charging apparatus (col 2 ln 19-21) which charges a secondary battery, comprising:

a voltage detecting circuit for detecting a battery voltage of said secondary battery and for outputting a signal in response to said detected battery voltage (12 and 36 in Fig. 1 and col 23 ln 57-58);

a current detecting circuit for detecting a battery current supplied to said secondary battery and for outputting a signal in response to said detected battery current (14, 20, and 36 in Fig. 1 and col 24 ln 37-38);

a charging circuit for controlling a current supply to said secondary battery to charge said secondary battery (28 and 36 in Fig. 1) such that said battery voltage detected by said voltage detecting circuit becomes substantially equal to a first pre-set battery voltage in response to a first input control signal applied thereto (col 2 ln 55-58 and col 24 ln 17-22) and also such that a charging current detected by the current detecting circuit becomes substantially equal to a charging current predetermined in response to a second input control signal applied thereto (col 2 ln 55-58 and col 24 ln 17-22); and

a charge control circuit (36 and 40 in Fig. 1) that instructs said charging circuit by sending said first and said second input control signals applied to said charging circuit to set said battery voltage and said charging current in response to a voltage indicated by said signal outputs from said voltage detecting circuit and said current detecting circuits respectively (col 2 ln 52-56).

With respect to claim 2, Broell discloses the battery charging apparatus as defined in Claim 1, wherein the charge control circuit instructs the charging circuit to perform a constant current charging in which a charging is executed to flow a first constant current to the secondary battery and subsequently another charging is executed to flow a second constant current greater than the first constant current to the secondary battery when the battery voltage of the secondary battery is smaller than a second pre-set voltage (col 2 ln 65-67 to col 3 ln 1-3), and instructs the charging circuit to perform pulse charging (col 10 ln 23-31), in which flowing current to said secondary battery and pausing current flow to said secondary battery are alternately performed at intervals of a pre-determined time period (Fig. 4 and 5).

With respect to claim 3, Broell discloses the battery charging apparatus as defined in claim 2, wherein the charge control circuit instructs the charging circuit to control the charging current flowing to the secondary battery such that the battery voltage becomes substantially equal to a third constant voltage during the constant current charging during the pulse charging (Fig. 5 and col 10 ln 12-14) and also such that the battery voltage becomes substantially equal to the first constant voltage smaller that the third constant voltage during the pausing in the pulse charging (Fig. 5 and col 10 ln 24-27).

With respect to claim 10, Broell discloses the battery charging apparatus as defined in claim 3, wherein the first constant voltage is a voltage greater than an over discharge voltage of the secondary battery (col 8 ln 61-62 and Fig. 3 and 5) and the third constant voltage is a voltage substantially equal to a full charge voltage of the secondary battery (col 10 ln 20-21 and Fig. 3 and 5).

With respect to claim 15, Broell discloses a charging method (col 2 ln 19-21) for a secondary battery, comprising the steps of:

first performing a first constant current charging by supplying a first constant current to the secondary battery when a battery voltage of the secondary battery is smaller than a first pre-set voltage (Fig. 3 and 5 and col 2 ln 65-67);

second performing a second constant current charging by supplying a second constant current greater than the first constant current to the secondary battery when the battery voltage of the secondary battery is greater than the first pre-set voltage (Fig. 3 and 5 and col 2 ln 66-67 to col 3 ln 1-3); and

operating a pulse charging when the battery voltage of the secondary battery becomes equal to or greater than a second pre-set voltage greater than the first pre-set voltage by alternately carrying out at intervals of a predetermined time period, a constant current charging in which the second constant current is supplied to the secondary battery and a pausing in which the supply of the constant current charging is stopped (Fig. 5 and col 10 ln 23-31).

With respect to claim 16, Broell discloses the battery charging apparatus as defined in claim 15, however, does not disclose expressly wherein the operating step comprises a step of controlling the charge current to the secondary battery such that the battery voltage of the secondary battery becomes substantially equal to a third constant voltage during the constant current charging of the pulse charging (Fig. 5 and col 10 ln 12-14) and such that the battery voltage of the secondary battery becomes substantially equal to a first constant voltage smaller than the third constant voltage during the pausing of the pulse charging (Fig. 5 and col 10 ln 24-27).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 4, 5, 13, 14, 17, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broell (US 5,710,506) in view of Eguchi (US 5,808,446).

With respect to claim 4, and as noted above under the rejection under 35 U.S.C. 102(b), Broell discloses the battery charging apparatus as defined in claim 3, however, does not

expressly disclose wherein the charge control circuit instructs the charging circuit to perform the constant current charging to supply the second constant current to the secondary battery when the battery voltage becomes substantially equal to a third pre-set voltage greater than the second pre-set voltage and also to perform the constant voltage charging to control the charging current such that the battery voltage becomes substantially equal to the third constant voltage when the battery voltage becomes substantially equal to a fourth pre-set voltage greater than the third pre-set voltage.

Eguchi discloses a method for charging in which the battery is charged with a constant current until it becomes equal to the full-charge voltage (col 7 ln 65-67 to col 8 ln 1-3), and then the battery is charged with a constant voltage so that the voltage battery after subtraction of the IR loss and the IRP loss finally equals the full-charge voltage (col 8 ln 15-19), and this method helps prevent the battery from exceeding the full-charge voltage after the losses are taken into effect (col 8 ln 18-19).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the battery charging apparatus of Broell to perform constant current charging when the battery voltage becomes equal to a pre-set voltage and to perform constant voltage charging when the battery voltage becomes greater than another pre-set voltage, as was the charging apparatus of Eguchi, so that the full-charge can be reached after the losses are taken into effect.

With respect to claim 5, and as noted above under the rejection under 35 U.S.C. 102(b), Broell discloses the battery charging apparatus as defined in claim 3, however, does not expressly disclose wherein the charge control circuit instructs the charging circuit to control the

charging current flowing through the secondary battery such that the battery voltage becomes substantially equal to the third constant voltage during the constant current charging before the pulse charging is executed.

Eguchi discloses a method in which the charging current is cut off after a predetermined time after a reference voltage is reached, the current is supplied again after the voltage drops down below the reference voltage, and then that process is repeated (col 8 ln 30-43), so that the voltage can become satisfactorily charged without being overcharged (col 8 ln 36-43).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the battery charging apparatus of Broell to control the charging current such that the battery voltage becomes substantially equal to the third constant voltage during the constant current charging before the pulse charging, as was the charging apparatus of Eguchi, so that the voltage can become satisfactorily charged without being overcharged.

With respect to claim 13, and as noted above under the rejection under 35 U.S.C. 102(b), Broell discloses the battery charging apparatus as defined in claim 1, however, does not expressly disclose wherein the secondary battery is a nonaqueous secondary battery.

Eguchi discloses a battery charging apparatus which enables safe and satisfactory charging of non-aqueous batteries (col 1 ln 66-67 to col 2 ln 1-2), so that non-aqueous and aqueous batteries could both be charged using the same device (col 1 ln 57-59).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the battery charging apparatus of Broell so that the secondary battery was a non-aqueous battery, so that either non-aqueous or aqueous batteries could be charged using the same device.

With respect to claim 14, and as noted above under the rejection under 35 U.S.C. 102(b), Broell discloses the battery charging apparatus as defined in claim 1, however, does not expressly disclose wherein the secondary battery is a lithium ion battery.

Eguchi discloses a battery charging apparatus which enables safe and satisfactory charging of non-aqueous batteries (col 1 ln 66-67 to col 2 ln 1-2), including lithium ion (col 1 ln 15-18), so that non-aqueous batteries, such as lithium ion, and aqueous batteries could both be charged using the same device (col 1 ln 57-59).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the battery charging apparatus of Broell so that the secondary battery was a lithium ion battery, so that either non-aqueous batteries, such as lithium ion, or aqueous batteries could be charged using the same device.

With respect to claim 17, and as noted above under 35 U.S.C. 102(b), Broell discloses the battery charging apparatus as defined in claim 15, however, does not expressly disclose the charging method as defined in claim 16, further comprising steps of first executing a constant current charging in which the constant current charging with the second constant current is performed to the secondary battery when the battery voltage of the secondary battery becomes substantially equal to the third pre-set voltage equal to or greater than the second pre-set voltage and second executing a constant voltage charging in which the charging current is controlled such that the battery voltage of the secondary battery becomes substantially equal to the third constant voltage when the battery voltage of the secondary battery becomes substantially equal to a fourth pre-set voltage equal to or greater than the third pre-set voltage.

Eguchi discloses the charging method as defined in claim 16 as noted above, further comprising steps of charging with a constant current until the battery voltage becomes equal to the full-charge voltage (col 7 ln 65-67), and then a constant voltage charge is used so that the current is progressively reduced without causing the battery voltage to exceed the full-charge voltage (col 7 ln 67 to col 8 ln 1-3) where the IR loss and the IRP loss are taken into effect (col 8 ln 16-19), so that the battery is not caused to exceed the full-charge voltage (col 8 ln 2-3).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the battery charging apparatus of Broell to include steps of charging with a constant current when the battery voltage becomes substantially equal to the third pre-set voltage and then charging with a constant voltage when the battery becomes substantially equal to a fourth pre-set voltage equal to or greater than the third pre-set voltage.

With respect to claim 21, and as noted above under the rejection under 35 U.S.C. 102(b), Broell discloses the battery charging apparatus as defined in claim 15, however, does not expressly disclose wherein the secondary battery is a nonaqueous secondary battery.

Eguchi discloses a battery charging apparatus which enables safe and satisfactory charging of non-aqueous batteries (col 1 ln 66-67 to col 2 ln 1-2), so that non-aqueous and aqueous batteries could both be charged using the same device (col 1 ln 57-59).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the battery charging apparatus of Broell so that the secondary battery was a non-aqueous battery, so that either non-aqueous or aqueous batteries could be charged using the same device.

With respect to claim 22, and as noted above under the rejection under 35 U.S.C. 102(b), Broell discloses the battery charging apparatus as defined in claim 15, however, does not expressly disclose wherein the secondary battery is a lithium ion battery.

Eguchi discloses a battery charging apparatus which enables safe and satisfactory charging of non-aqueous batteries (col 1 ln 66-67 to col 2 ln 1-2), including lithium ion (col 1 ln 15-18), so that non-aqueous batteries, such as lithium ion, and aqueous batteries could both be charged using the same device (col 1 ln 57-59).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the battery charging apparatus of Broell so that the secondary battery was a lithium ion battery, so that either non-aqueous batteries, such as lithium ion, or aqueous batteries could be charged using the same device.

13. Claims 9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broell (US 5,710,506) in view of Saeki (US 6,452,364).

With respect to claim 9, and as noted above under 35 U.S.C. 102(b), Broell discloses the battery charging apparatus as defined in claim 2, however, does not expressly disclose the apparatus further comprising a charge-end detecting circuit that determines an event that indicates a charging is completed relative to the second battery and outputs a predetermined signal when the charging current detected by the current detecting circuit becomes lower than the first constant current, and wherein the charge control circuit causes the charging circuit to stop the charging upon receiving the signal indicative of a charge end output from the charge-end detecting circuit.

Saeki discloses a battery charging apparatus where the operation of the control unit is stopped, which ends the charging of the battery (col 12 ln 8-10), after it has been determined that the battery is fully charged (col 12 ln 7-8) and after the charging current is determined to be lower than a predetermined value (col 11 ln 60-61), so that there is a detection of the completed charge, and one of ordinary skill in the art knows that such implementation would keep the battery from being overcharged and therefore damaged.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the battery charging apparatus of Broell to include a charge-end detecting circuit wherein the charging is stopped after receiving a charge end signal, and one of ordinary skill in the art knows that such implementation would keep the battery from being overcharged and therefore damaged.

With respect to claim 20, and as noted above under 35 U.S.C. 102(b), Broell discloses the battery charging apparatus as defined in claim 15, however, does not expressly disclose the charging method further comprising steps of determining that the charging is completed when the charging current to the secondary battery becomes substantially equal to a predetermined current value smaller than the first constant current and subsequently terminating the charging to the secondary battery.

Saeki discloses a battery charging apparatus where the operation of charging is stopped when the charging current reaches a predetermined level (col 6 ln 42-45 and Fig. 5B), so that there is a detection of the completed charge, and one of ordinary skill in the art knows that such implementation would keep the battery from being overcharged and therefore damaged.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the battery charging apparatus of Broell to include steps of determining that the charging is completed when the charging current to the secondary battery becomes substantially equal to a predetermined current value and subsequently terminating the charging, and one of ordinary skill in the art knows that such implementation would keep the battery from being overcharged and therefore damaged.

Allowable Subject Matter

14. Claims 6-8, 11, 12, and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 6 recites, inter alia, a battery charging apparatus as defined in claim 3 wherein the charge control circuit instructs the charging circuit to control the charging current such that the battery voltage becomes equal to the first constant voltage when it is smaller than the first pre-set voltage and such that the battery voltage becomes equal to the second constant voltage during the constant current charging before the pulse charging.

Claim 7 recites, inter alia, the battery charging apparatus as defined in claim 5, wherein the charging circuit further comprises a constant voltage generating circuit that generates first, second, and third voltages, a voltage switching circuit that selects and outputs one of the first and third constant voltages in accordance with control signals, and a control circuit that controls the transistor such that the battery voltage and current become equal to signals that represent a voltage and current from the voltage and signal switching circuits.

Claim 8 recites the same battery charging apparatus as claim 7 above, except that claim 8 is dependent on claim 6 instead of claim 5.

Claim 11 recites, inter alia, the battery charging apparatus as defined in claim 7.

Claim 12 recites, inter alia, the battery charging apparatus as defined in claim 8.

Claim 19 recites, inter alia, the charging method as defined in claim 1, wherein the charging current to the secondary battery is controlled such that the battery voltage becomes equal to the first constant voltage when it is smaller than the first pre-set voltage during the first constant current charging and such that the battery voltage becomes equal to the second constant voltage during the first constant current charging.

The art of record does not disclose the above limitations, nor would it be obvious to modify it in such a manner.

Remarks

15. Regarding claim 18, although no art has been applied to the claim, allowable subject matter cannot be identified at this time due to the 35 U.S.C. 112, second paragraph, rejection as noted above.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shimomoto (US 5,500,584) discloses another example of a battery charging device with initial, intermittent, and final charging processes (col 1 ln 66-67 to col 2 ln 1-9).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron Piggush whose telephone number is 571-272-5978. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry can be reached on 571-272-2084. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

5/16/05

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